

RECEIVED
CENTRAL FAX CENTER

MAR 06 2008

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method for simulating an electrical network, whereby the inconsistencies in the system of differential equations of the electrical network are detected by the following steps:

providing a computer system including a memory, an arithmetic unit, an input device and an output device;

providing a system of equations describing the technical system electrical network, the equations having the form

$f(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p}) = 0$, including:

$$f_1(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p}) = 0,$$

$$f_2(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p}) = 0,$$

$$\vdots$$

$$f_n(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p}) = 0,$$

wherein $\underline{x}(t)$ and derivatives $\dot{\underline{x}}(t), \dots, \underline{x}^{(k)}$ thereof in each case have m number of elements, and \underline{p} is a parameter vector that can occur in the system of equations; and

Applic. No. 10/723,642

Response Dated March 6, 2008

Responsive to Office Action of December 6, 2007

executing a test method for providing error information relating to inconsistencies in the system of equations on the computer system, the test method having the following steps 1 to 3:

step 1: setting up a dependence matrix \underline{A} with m number of columns and n number of rows, and setting an element \underline{A} to

$\underline{A}(i,j) \neq 0$ when an i^{th} row of $\underline{f}(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), p)$ defined with

$\underline{f}_i(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t))$ is a function of

a) a j^{th} element of \underline{x} expressed as $\underline{x}_j(t)$; or

b) one of the derivatives of the j^{th} element of \underline{x} defined as $\underline{x}_j^{(s)}(t)$;

and otherwise setting the element $\underline{A}(i,j)=0$;

step 2: determining a set of row ranks each having numbers of those rows of the dependence matrix \underline{A} that are mutually dependent and determining a set of column ranks of the dependence matrix \underline{A} each having numbers of those columns of the dependence matrix \underline{A} that are mutually dependent if such row ranks and/or column ranks are present; and

Applic. No. 10/723,642
Response Dated March 6, 2008
Responsive to Office Action of December 6, 2007

step 3: outputting at the output device error information
containing the numbers contained in each row rank determined
in step 2 and in each column rank determined in step 2;

wherein the row rank includes a set C_r of natural numbers i ,
where $1 \leq i \leq n$, of the matrix A with the n number of rows and
the m number of columns when it fulfils the conditions of:

i) no transversal T of the matrix A such that C_r is contained
in the set of row indices of T , and

ii) for each element c of C_r there is a transversal T of the
matrix A such that $C_r \setminus \{c\}$ is wholly contained in the set of
the row indices of T ,
and

the column rank comprises a set C_c of natural numbers i , where
 $1 \leq i \leq m$, of the matrix A with the n number of rows and the m
number of columns when it fulfils the conditions of:

i) no transversal T of the matrix A such that C_c is contained
in the set of row indices of T , and

Applic. No. 10/723,642
Response Dated March 6, 2008
Responsive to Office Action of December 6, 2007

ii) for each element c of C_s , there is a transversal T of the matrix \underline{A} such that $C_s \setminus \{c\}$ is wholly contained in the set of the column indices of T .

Claim 2 (previously presented): The method according to claim 1, which further comprises:

prior to executing step 1:

applying an equation significance list of length of the n number in which each equation of the system of equations is assigned at least one of an equation number and an item of equation text information; and

applying a component significance list of length of the m number in which each component of a solution vector \underline{x} is assigned at least one of a component number and an item of component text information;

in step 3, outputting at least one of the equation number and the item of equation text information in accordance with the equation significance list instead of outputting the numbers contained in each row rank; and

in step 3, outputting at least one of the component number and the item of component text information in accordance with the

Applic. No. 10/723,642
Response Dated March 6, 2008
Responsive to Office Action of December 6, 2007

component significance list instead of outputting the numbers contained in each column rank.

Claim 3 (previously presented): A computer running a computer program, comprising computer-executable instructions for executing a method for simulating an electrical network according to claim 1.

Claim 4 (previously presented): A computer running a computer program with computer-executable instructions for executing a method for simulating an electrical network according to claim 2.

Claim 5 (original): A computer system programmed to execute a method for numerical simulation of a technical system according to claim 1.

Claim 6 (original): A computer system programmed to execute a method for numerical simulation of a technical system according to claim 2.

Claim 7 (currently amended): A ~~computer running a computer-readable medium~~ computer memory including computer-executable instructions for performing the method according to claim 1 when run on a computer.

Applic. No. 10/723,642
 Response Dated March 6, 2008
 Responsive to Office Action of December 6, 2007

Claim 8 (previously presented): The method of claim 1, further comprising the step of downloading a computer program product or a computer program with computer-executable instructions for executing a method for numerical simulation of a technical system according to claim 1 from an electronic data network onto a computer connected to the data network.

Claim 9 (original): The method according to claim 8, wherein the electronic data network is the Internet.

Claim 10 (currently amended): A computer program product ~~or computer program~~ for simulating an electrical network, whereby the inconsistencies in a system of differential equations of the electrical network are detected with the aid of a computer or with the aid of an analog computer and the system of equations is of the form $f(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p}) = 0$, including:

$$f_1(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p}) = 0,$$

$$f_2(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p}) = 0,$$

$$\vdots$$

$$f_n(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p}) = 0,$$

Applic. No. 10/723,642
 Response Dated March 6, 2008
 Responsive to Office Action of December 6, 2007

where $\underline{x}(t)$ and derivatives $\dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t)$ thereof respectively have m number of elements, and \underline{p} is a parameter vector that can occur in the system of equations; and

the method comprising the following steps:

step 1: setting up a dependence matrix \underline{A} with m number of columns and n number of rows, and setting an element \underline{A} to

$\underline{A}(i,j) \neq 0$ when an i^{th} row of $\underline{f}(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t), \underline{p})$ defined with $\underline{f}_i(t, \underline{x}(t), \dot{\underline{x}}(t), \dots, \underline{x}^{(k)}(t))$ is a function of

a) a j^{th} element of \underline{x} expressed as $\underline{x}_j(t)$; or

b) one of the derivatives of the j^{th} element of \underline{x} defined as $\underline{x}_j^{(s)}(t)$;

and otherwise setting the element $\underline{A}(i,j)=0$;

step 2: determining a set of row ranks each having numbers of those rows of the dependence matrix \underline{A} that are mutually dependent and determining a set of column ranks of the dependence matrix \underline{A} each having numbers of those columns of the dependence matrix \underline{A} that are mutually dependent if such row ranks and/or column ranks are present;

Applic. No. 10/723,642
Response Dated March 6, 2008
Responsive to Office Action of December 6, 2007

step 3: outputting error information containing the numbers contained in each row rank determined in step 2 and in each column rank determined in step 2; and

the row rank includes a set C_2 of natural numbers i , where $1 \leq i \leq n$, of the matrix \underline{A} with the n number of rows and the m number of columns when it fulfils the conditions of:

i) no transversal T of the matrix \underline{A} such that C_2 is contained in the set of row indices of T , and

ii) for each element c of C_2 there is a transversal T of the matrix \underline{A} such that $C_2 \setminus \{c\}$ is wholly contained in the set of the row indices of T ,

and

the column rank comprises a set C_3 of natural numbers i , where $1 \leq i \leq m$, of the matrix \underline{A} with the n number of rows and the m number of columns when it fulfils the conditions of:

i) no transversal T of the matrix \underline{A} such that C_3 is contained in the set of row indices of T , and

Applic. No. 10/723,642
Response Dated March 6, 2008
Responsive to Office Action of December 6, 2007

ii) for each element c of C_s , there is a transversal T of the matrix A such that $C_s \setminus \{c\}$ is wholly contained in the set of the column indices of T .

Claim 11 (currently amended): The computer program product ~~and computer program~~ according to claim 10, wherein the method for providing error information relating to inconsistencies further comprises:

prior to executing step 1:

applying an equation significance list of length of the n number in which each equation of the system of equations is assigned at least one of an equation number and an item of equation text information; and

applying a component significance list of length of the m number in which each component of a solution vector x is assigned at least one of a component number and an item of component text information;

in step 3, outputting at least one of the equation number and the item of equation text information in accordance with the equation significance list instead of outputting the numbers contained in each row rank; and

Applic. No. 10/723,642
Response Dated March 6, 2008
Responsive to Office Action of December 6, 2007

in step 3, outputting at least one of the component number and the item of component text information in accordance with the component significance list instead of outputting the numbers contained in each column rank.

Claim 12 (currently amended): A ~~computer interpreting a data carrier with to run~~ a computer program product ~~or computer program~~ according to claim 10 for simulating an electrical network when run on a computer.

Claim 13 (currently amended): A ~~computer interpreting a data carrier with to run a~~ computer program product ~~or computer program~~ according to claim 11 for simulating an electrical network when run on a computer.

Claim 14 (currently amended): A computer running the computer program product ~~or computer program~~ according to claim 10 which is carried in a ~~computer-readable medium~~ computer memory.

Claim 15 (currently amended): A computer running the computer program product ~~or computer program~~ according to claim 11 which is carried in a ~~computer-readable medium~~ computer memory.

Claim 16 (currently amended): A computer running system ~~programmed to execute the instructions contained in the~~

Applic. No. 10/723,642

Response Dated March 6, 2008

Responsive to Office Action of December 6, 2007

computer program product ~~or computer program~~ according to
claim 10 which is carried in a computer memory.

Claim 17 (currently amended): A computer system programmed to
execute the instructions contained in the computer program
product ~~or computer program~~ according to claim 11.

Claims 18 - 20 (canceled)